



Exploring Tremont with Geometric Shapes

Submitted by: Emily McDonald, Geometry
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Target Grade: 9th-12th Grade, Geometry

Time Required: 60 minutes

Standards

Common Core Mathematics Standards

- [CCSS.MATH.CONTENT.HSG.MG.A.1](#) Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
- [CCSS.MATH.CONTENT.HSG.MG.A.3](#) Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

Lesson Objectives

Students will:

- Explore Tremont and use geometric shapes and measurements to represent landmarks during the exploration.
- Learn about the Great Smoky Mountains Institute at Tremont.
- Solve geometric models and shapes.
- Create a geometric model digitally using Desmos.com.

Central Focus

This cross-curricular geometry lesson promotes the exploration of the Great Smoky Mountains Institute at Tremont through VR and geometric shapes. This lesson is best used as a small-group, station lesson. Students will utilize a VR headset to explore the Tremont VR Experience app.

Key terms: virtual reality, explore, shape, stations



Background Information

Students should have basic knowledge of geometric shapes and their properties. For this lesson students should focus on triangles, squares, rectangles, cylinders, cones, and pyramids.

Constructing an equilateral triangle:

<https://mathbitsnotebook.com/Geometry/Constructions/CCconstructionEqui.html>

Constructing a square:

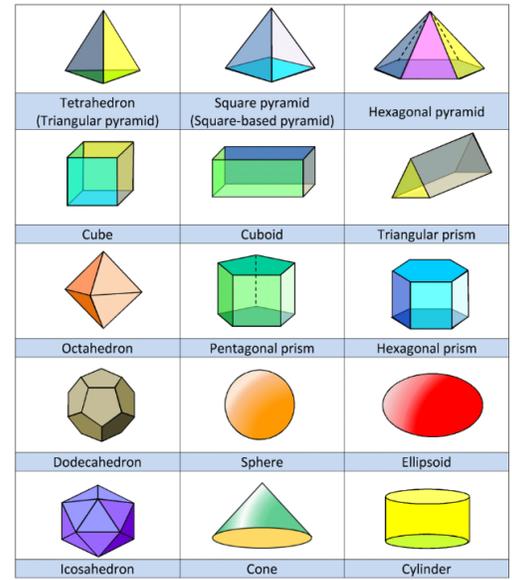
<https://mathbitsnotebook.com/Geometry/Constructions/CCconstructionSquare.html>

Tremont is a region in the Great Smokey Mountains National Park, located in the southeastern United States. Tremont was formerly home to a pioneer Appalachian community and logging town. Now, it is the location of the Great Smoky Mountains Institute at Tremont. Tremont is situated along the Middle Prong of Little River and applies to Middle Prong's entire watershed between Miry Ridge to the east and Defeat Ridge to the west. Both of these ridges run perpendicular to the main crest of the Great Smokies, which rises several thousand feet above Tremont to the south.

The Great Smoky Mountains Institute at Tremont hosts programs for youth, educators, and adults that not only get them outside in nature learning about the environment around them, but also teach critical thinking and self-discovery. Their wonderful facility can be explored in an online or VR tour, linked below.

Materials

- Classroom conducive for stations and small-group work
- Tremont Exploration Guide - handout
- 10 VR headsets for two stations (5 for each station)
 - Prior to class, load the *Tremont VR Experience* onto your devices. It is currently available in the Oculus Store and the Google Play Store.
 - If you do not have VR headsets, the 360 degree Tremont tour can be conducted on computers. Access it at: <https://orise.orau.gov/resources/k12/activities-and-games.html>
- 10 headphones for VR headsets (5 for each station)
- Internet-capable device/computer (i.e. Chromebook, tablet, etc.) for three stations



<https://www.math-salamanders.com/list-of-geometric-shapes.html>



Instruction

Introduction (5 minutes)

- Students will virtually explore the Great Smoky Mountains Institute at Tremont using geometric shapes.
- This lesson will be completed in 5 stations/rotations. Students may start at any station. The order of the stations and rotation does not matter.
- Students will rotate to each station in a small group (4-6 students depending on class size).
- Students will complete the Tremont Exploration Guide.

Station 1: VR Tremont (Part 1, 10 minutes)

- Students will explore Tremont virtually using a VR app and headset and will answer questions about modeling locations at Tremont with geometric shapes.

Station 2: Research about Tremont (10 minutes)

- Students will research information about the Great Smoky Mountains Institute at Tremont and answer the questions on the Tremont Exploration Guide.

Station 3: Delta Math practice (10 minutes)

- Students will use the online math practice website Delta Math (<https://www.deltamath.com/>) to complete a geometric modeling assignment. Delta Math is a free online program for teachers and students. Teachers can assign questions based on concepts for student practice, allow multiple attempts for problems, and assign test correction assignments.
- The teacher should assign the following sections to students:
 - Constructing an Equilateral Triangle
 - Constructing a Square
 - Volume of Rectangular Prisms
 - Volume of a Cylinder
 - Volume of a Cone
 - Volume of a Pyramid

Station 4: VR Tremont (Part 2, 10 minutes)

- Students will explore Tremont virtually using a VR app and headset and will answer questions about modeling locations at Tremont with geometric shapes.

Station 5: Model with the Desmos Geometry Tool (10 minutes)

- Link to Desmos Geometry Tool: <https://www.desmos.com/geometry>.
- Students should create an account and submit the link to their creation on Google Classroom (or appropriate LMS).



Closure: Summary (5 minutes)

- Students will briefly share their overall learning with the class through discussion.

Differentiation

Modifications:

- Station activities could be modified to provide additional scaffolding or examples.
- Student may be grouped to ensure academic success.

Extensions:

- Additional stations can be added to provide additional exploration.
- Students that finish their station explorations early may become peer helpers in their group.

Assessment

Formative Assessment

- Students will be formatively assessed through the Tremont Exploration Guide. The teacher should review the answers from the worksheet.

Tremont Exploration Guide

Explorer (Student Name): _____

Station 1: Tremont VR Field Trip - Part 1

Using the VR headset, you will need to answer the following questions:

- 1) Go to the Pavilion
 - What geometric shape(s) should be used to model this?

 - Select one of the shapes you listed above. Write a problem that uses that shape to model this location.

- 2) Go to the Basketball Courts (next to Play Field)
 - What geometric shape(s) should be used to model this?

 - Select one of the shapes you listed above. Write a problem that uses that shape to model this location.

 - Listen to the speaker at the Play Field. What is the Play Field used for?

Station 2: Information Scavenger Hunt

You will need to scavenge for information about the Great Smoky Mountains Institute at Tremont. Using the computer to research, answer the following questions:

- 1) What is the Great Smoky Mountains Institute at Tremont?

- 2) What is the mission of the Great Smoky Mountains Institute at Tremont?

- 3) What year was the Great Smoky Mountains Institute at Tremont founded?

- 4) How long do visitors typically stay onsite at Tremont?

- 5) What are the four ways that Tremont achieves their mission:
 -
 -
 -
 -

6) Draw and label the Tremont Institute Education Cycle?

Station 3: Delta Math

Visit: <https://www.deltamath.com/>

Login and complete the assignment titled “Tremont Exploration - Practice Problems.”

Tremont Exploration - Practice Problems	0%
? Constructing an Equilateral Triangle	0/5
? Constructing a Square	0/5
? Volume of Rectangular Prisms	0/5
? Volume of a Cylinder	0/5
? Volume of a Cone	0/5
? Volume of a Pyramid	0/5

Station 4: Tremont VR Field Trip - Part 2

Using the VR headset, you will need to answer the following questions:

- 1) Go to Friendship Circle
 - What geometric shape(s) should be used to model this?
 - Select one of the shapes you listed above. Write a problem that uses that shape to model this location.
- 2) Go to Stump Circle
 - What geometric shape(s) should be used to model this?
 - Select one of the shapes you listed above. Write a problem that uses that shape to model this location.

Station 5: Model with the Desmos Geometry Tool, 10 minutes

You will create a geometric model digitally using the Desmos Geometry tool. After you have constructed your model, you should submit a link of your model on Google Classroom (or appropriate LMS).

- Go to the following link: <https://www.desmos.com/geometry>
- Sign-in, title your construction, and don't forget to hit the “Save” button.

The Council House at Tremont is a heptagon (seven-sided polygon).

- Construct a heptagon
- Label the angles
- Label the side lengths
- Copy the URL of your construction and submit the link on Google Classroom (or LMS)

Tremont Exploration Guide - Key

Explorer (Student Name): _____

Station 1: Tremont VR Field Trip - Part 1

Using the VR headset, you will need to answer the following questions:

- 1) Go to the Pavilion
 - What geometric shape(s) should be used to model this?
Possible Answers: Triangles, Square, Rectangle, Cube, Prism

- 2) Go to the Basketball Courts (next to Play Field)
 - What geometric shape(s) should be used to model this?
Possible Answers: Square, Rectangle

 - Listen to the speaker at the Play Field. What is the Play Field used for?
Possible Answer: Frisbee, four-square, basketball

Station 2: Information Scavenger Hunt

You will need to scavenge for information about the Great Smoky Mountains Institute at Tremont. Using the computer to research, answer the following questions:

- 1) What is the Great Smoky Mountains Institute at Tremont?
Possible Answer: Great Smoky Mountains Institute at Tremont provides in-depth experiences through education programs that celebrate ecological and cultural diversity, foster stewardship, and nurture appreciation of Great Smoky Mountains National Park.

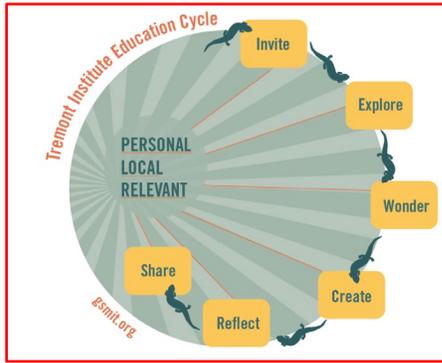
- 2) What is the mission of the Great Smoky Mountains Institute at Tremont?
Our mission is to deliver experiential learning for youth, adults, and educators through programs that promote self-discovery, critical thinking, and effective teaching.

- 3) What year was the Great Smoky Mountains Institute at Tremont founded?
1969

- 4) How long do visitors typically stay onsite at Tremont?
3-10 days

- 5) What are the four ways that Tremont achieves their mission:
 - Residential programs
 - Research that complements their learning laboratories
 - Community Engagement
 - Advocacy for outdoor learning

- 6) Draw and label the Tremont Institute Education Cycle?



Station 3: Delta Math

Visit: <https://www.deltamath.com/>

Login and complete the assignment titled “Tremont Exploration - Practice Problems.”

Station 4: Tremont VR Field Trip - Part 2

Using the VR headset, you will need to answer the following questions:

- 1) Go to Friendship Circle
 - What geometric shape(s) should be used to model this?
Possible Answers: Heptagon, Square, Rectangle, Cylinder

- 2) Go to Stump Circle
 - What geometric shape(s) should be used to model this?
Possible Answers: Circle, Cylinder

Station 5: Model with the Desmos Geometry Tool, 10 minutes

You will create a geometric model digitally using the Desmos Geometry tool. After you have constructed your model, you should submit a link of your model on Google Classroom (or appropriate LMS).

- Go to the following link: <https://www.desmos.com/geometry>
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